

DRAWING AMENDMENTS:

Figure 3 is amended herein to correct the block diagram comments related to Equation 1.

A marked up sheet showing the proposed changes to Figure 3 is attached at Appendix A.

A clean amended "Replacement Sheet" for Figure 3 is attached at Appendix B.

REMARKS

Claims 1-41 are pending in the application.

Claim 40 is amended above to overcome the section 101 claim rejection.

The specification is amended above to add section headings and to correct an error in a mathematical formula.

Figure 3 is amended to correct an error in the same mathematical formula that is corrected in the specification.

No new matter has been added to the application by way of these specification and claim amendments.

I. FORMULA CORRECTION

The specification and Figure 3 are amended herein to correct an error in a mathematical equation. Specifically, Equation 1 on page 16 of the specification as published is incorrect. The same error is found in the text of Figure 3 and also in the final paragraph on page 16 (starting line 24).

The corrections do not add new matter to the application because original Claim 6 claims the relationship and is consistent with the correct version of Equation 1 above. Moreover, it would be apparent to one skilled in the art at the time of the invention that statement about original Equation 1 at page 16 cannot be true. The correct form of Equation 1 would be further apparent to the skilled person upon reading the specification including Claim 6.

II. THE SPECIFICATION OBJECTION

The examiner objected to the specification for lacking section headings.

The objection is overcome by amending the specification above to include section headings.

III. THE SECTION 101 REJECTION OF CLAIM 40

The examiner rejected claim 40 under 35 U.S.C. Section 101 for being directed to non-statutory subject matter.

The examiner's rejection is overcome by amending claim 40 above to define

statutory subject matter.

IV. TRAVERSE OF THE ANTICIPATION REJECTION

The examiner rejected claims 1-2, 4, 9, 13-15, 17, 25-27, 29, 34, 38-39 and 40-41 for being anticipated by Gopinath et al. (USP 6,609,093) (hereinafter Gopinath). The examiner's rejection is traversed at least because Gopinath does not disclose all of the features of each of the independent claims.

A. The Claimed Invention

The application includes independent claims 1, 14, 26, 40 and 41 which are directed variously towards a signal processing system, an associated method claim, computer program claim and a claim to a speech recogniser. These independent claims are however regarded as being broadly equivalent to one another and each comprise the following two key elements:

- (i) that during the optimisation procedure the class mean vectors maintain constant modulus; and
- (ii) that the input data encoding vectors are normalised.

B. The Anticipation Rejection Traverse

In order for a reference to anticipate, the reference must show the same invention in as complete a detail as claimed. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Moreover, the elements must be arranged in the reference as required by the claim. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Gopinath does not anticipate any claim at least because it does not disclose either of the key claim elements listed above.

It is also noted that the Examiner has only provided detailed comments about the basis for rejecting Claim 26 for anticipation. The Applicant's novelty comments will therefore be made within the context of Claim 26. The following comments are, however, regarded as being applicable to all the independent claims and that all the independent claims are distinguished over Gopinath et al by virtue of the same arguments.

1. Gopinath does not disclose class mean vectors that maintain constant modulus during an optimization procedure

All rejected claims are novel because Gopinath fails to teach a method whereby the mean vectors are maintained at a constant modulus during optimization procedures. Instead, Gopinath teaches a method whereby the projection matrix θ is optimised in an iterative manner. The class means in Gopinath are not being optimised at the same time contrary to the examiner's position in the Office Action. In Gopinath, the projection of the class means by the matrix θ does change with θ , but the means themselves are not being optimised as the claims require. For at least this reason all rejected claims are novel in view of Gopinath.

2. Gopinath does not normalize input data encoding vectors

All rejected claims are also novel because Gopinath does not disclose normalizing input data encoding vectors. The examiner takes the position that the Gopinath "transformed" step is equivalent to the claimed normalizing. However, the claimed "normalized" is not the equivalent of Gopinath's "transformed" teachings.

By way of explanation, Gopinath's vector inputs to the Gaussian model are "transformed" using a projection matrix. This transformation does not have the effect of normalising the vectors to have constant moduli as claimed. The normalisation in the present application is not a linear operation. Gopinath only discloses linear "transformation" at column 3, lines 26-30), and therefore cannot be accomplished using a linear projection.

It is also noted that Gopinath's projections of the mean vectors will not have constant modulus at each dimension. This is explicit in Gopinath at column 5, lines 43-44, which states only a non-zero determinant constraint on $\theta * \text{transpose}(\theta)$ (see the extract that reads "no special provisions have been made for θ eigenvalue scalings of $\theta * \text{transpose}(\theta)$ "). It is further noted that even with a constraint on θ , extra procedures – not disclosed in Gopinath - would be needed to constrain the vectors to constant moduli. For at least these reasons independent claim 26 is novel. Moreover, rejected independent claims 1, 14, 40 and 41 include the same novel features found in claims 26 and they, and their corresponding dependent claims, are novel over Gopinath for at least the same reasons.

3. Claims 2, 15 and 27 are novel

With respect to Claim 27 (and by extension to Claims 2 and 15) it is noted that Gopinath does not state the covariance is isotropic - which is what the examiner maintains. Instead, Gopinath discloses the covariance is diagonal. Indeed, Gopinath advocates diagonal matrices (i.e. with error hyper-ellipsoids), not ones that are isotropic (i.e. with error hyper-spheres). In fact, the possible covariance diagonalisation expressions that appear in Gopinath would not inherently produce isotropic covariance matrices. The difference cause claims 2, 15 and 27 to be independently novel.

V. ALLOWABLE SUBJECT MATTER

The Applicant acknowledges that claims 3, 5-8, 10-12, 16, 18-24, 28, 30-33 and 35-37 are allowable and would be allowed if written in independent form

CONCLUSION

The application is believed to be ready for patenting for at least the reasons recited above. Favorable reconsideration and allowance of this application is, therefore, courteously solicited.

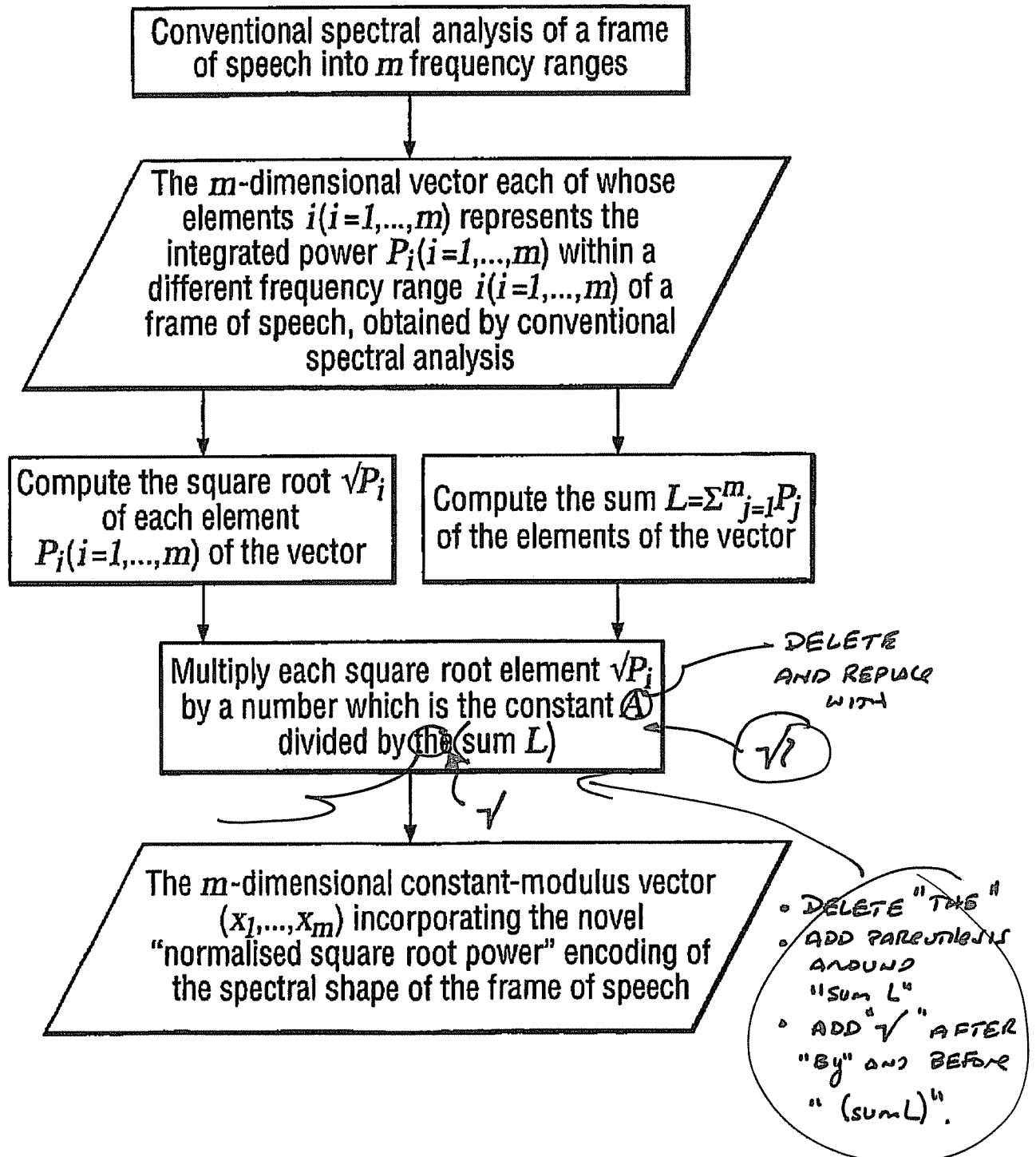
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Appendix A

(Figure 3 – Marked Up)

Fig.3.



Appendix B

(Figure 3 – Replacement Sheet)